

COVID-19
AND ANIMAL EXPLOITATION:
PREVENTING THE NEXT GLOBAL PANDEMIC

THE LINKS BETWEEN ANIMAL USE AND ALMOST EVERY
MAJOR OUTBREAK OF THE LAST 120 YEARS

THE CASE FOR ABOLISHING ANIMAL EXPLOITATION TO
SAVE COUNTLESS HUMAN AND NON-HUMAN LIVES

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REVIEWED BY
DR. MICHAEL GREGER

SURGE

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PREFACE

Written by laypersons for layreaders in easily accessible language and published during the COVID-19 pandemic of 2020, this white paper examines the links between outbreaks of zoonotic diseases - caused when infectious pathogens are passed to humans from non-human animals - and our exploitation of those animals.

The specific details of several notable zoonotic diseases, or zoonoses, including the most widely accepted theories of their origins and the factors contributing to their transmission to humans, will be examined to ascertain to what degree human exploitation of non-human animals played in the resulting outbreaks.

Where animal exploitation is identified as a significant contributing factor, to provide balance where possible, a fair evaluation of the likelihood of the transmission of each zoonotic disease in the absence of that exploitation will also be attempted. It is the belief of the authors that animal exploitation increases the risk of zoonotic outbreaks and therefore potential pandemics, and by reviewing past occurrences in this way, either strengthen or weaken this hypothesis in a qualitative sense.

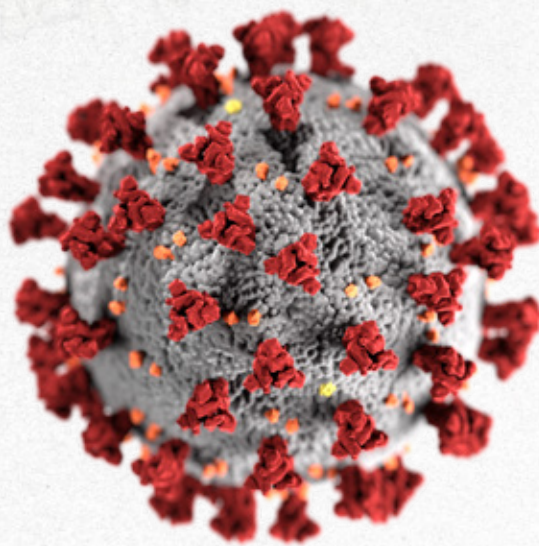
By asking these questions, the overarching aim of this white paper is to provide context for a broader and more important discussion about whether the risk of future pandemics can be lessened or mitigated by moving away from our widespread use of animals for food primarily, though we will also briefly touch upon globalisation, urbanisation and climate change.

The scope of this white paper, in regards to which diseases are examined, will be limited to notable viral (with one exception) outbreaks, epidemics and pandemics from the 1900s onwards with clear links to animal exploitation according to the leading theories of their origins. This is not to create bias towards a particular conclusion as the claim is not that abolishing animal exploitation will result in zero outbreaks or pandemics, only that the relative risks of the emergence of future zoonoses could be significantly diminished. Human lives therefore may be saved to the degree that abolishing animal exploitation should be seriously considered in the interest of public health and the rights of non-human animals. Also, apart from state-imposed quarantine, measures to prevent viral outbreaks predominantly centre around stockpiles of antiviral drugs of questionable effectiveness such as Oseltamivir

(Tamiflu) and Zanamivir (Relenza), and vaccination programmes that are initially reactive before becoming preventative, and take some months to develop for each new virus, subtype and strain against which we have little or no herd immunity. Existing vaccines become ineffective due to viral mutation and the emergence of new strains such as influenza and antigenic shift - this being when the markers (antigens) that identify viruses and other pathogens change enough to make them unrecognisable to the body's immune system.

What differentiates a cross-border pandemic from an epidemic or other localised outbreak will also be acknowledged, as there are many human factors that give rise to true pandemics including speed of response by health authorities and increasing globalisation (travel).

The final points for exploration will centre around the consistency of zoonotic outbreaks and how the focus should be on reducing and eliminating situations that increase contact with animals, such as bats, pigs and poultry. A roadmap for a reduction and total abolition of animal use by humans is outside the remit of this paper, as is identifying the agents of that change be they governmental, societal or otherwise, but in compiling a range of authoritative sources including the World Health Organisation (WHO), Centers for Disease Control and Prevention (CDC), Food and Agriculture Organization of the United Nations (FAO) and World Organisation for Animal Health (OIE) and ending with a clear call-to-action, it is hoped the first step will have been taken.



A visualisation of the SARS-CoV-2 virus that causes COVID-19 | Source: CDC

OUR THANKS TO DR MICHAEL GREGER



We wish to express our heartfelt gratitude to Dr Michael Greger, M.D. FACLM, for taking the time to review this white paper prior to publication and in doing so lend us his breadth of expertise.

Founder of NutritionFacts.org and known worldwide for his work championing plant-based nutrition as the answer to many chronic health conditions, which he writes about in his seminal New York Times best-selling book of 2015 *How Not To Die*, Dr Greger also has a background in infectious disease, authoring his earlier work *Bird Flu: A Virus of Our Own Hatching* in 2006.

Dr Greger is an internationally recognized speaker on

nutrition, food safety, and public health issues. One talk in particular, addressing The Humane Society of the United States in 2008 on the subject of *pandemic prevention*, was hugely influential in inspiring and informing this white paper. For more than a decade, Dr Greger has warned us of the pandemic threat posed by zoonotic diseases, particularly avian influenza. Readers can find a link to the recording of Dr Greger's presentation on the Surge website at www.surgeactivism.com/covid19 (sources and citations).

A founding member and Fellow of the American College of Lifestyle Medicine, Dr Greger is licensed as a general practitioner specializing in clinical nutrition. He is a graduate of the Cornell University School of Agriculture and Tufts University School of Medicine. In 2017, Dr Greger was honored with the ACLM Lifestyle Medicine Trailblazer Award and became a diplomat of the American Board of Lifestyle Medicine.

A NOTE ABOUT THE AUTHORS

This white paper was written by Andrew Gough, Vegan Education Coordinator for Surge, expanding on the research materials brought together by Surge co-founder Ed Winters and the media team when preparing for our extensive series of videos on antibiotic resistant bacteria, COVID-19 and bird flu, plus the Disclosure Podcast episode with Dr Greger. Although keenly interested in zoonotic diseases from an animal rights perspective, it should be noted

that the Surge team does not have a background in microbiology, epidemiology or any fields related to the study of infectious diseases. This is why we are enormously thankful to Dr Greger for sparing his time in reviewing this publication and for speaking with Ed for a *Disclosure Podcast* interview on future pandemics - the link to which readers can also find on the Surge website.

ABOUT SURGE

Founded in 2016, Surge is a grassroots animal rights organisation determined to create a world where compassion towards all non-human animals is the norm. Our aim is to spread awareness through campaigns, online content, educational programmes and investigative work. Surge is committed to positive community building, teamwork and the abolition of animal use. Our vision is a world in which all animals are free from human-inflicted oppression and violence, our vision is therefore of a vegan world. Surge focuses on veganism as we believe that it is through veganism that we'll collectively end the oppression of non-human animals.

Our philosophy is that change comes through education, campaigning and community building.

Through our many projects and operations, our mission is to push animal rights forward into mainstream public thinking, as well as encouraging unity through community-based activism. Ed Winters (known online as Earthling Ed) is the Co-Founder and Co-Director of Surge. Ed and the Surge team are based in London, England.

1. INTRODUCTION

"Scientists estimate that more than six out of every ten known infectious diseases in people can be spread from animals, and three out of every four new or emerging infectious diseases in people come from animals."¹

- Centres for Disease Control and Prevention (CDC)

On December 31st 2019, the first reports of 'pneumonia with unknown cause' were reported in Wuhan City in the Hubei Province of China. Just one month later, nearly 10,000 confirmed cases and more than 200 deaths across 19 countries had been attributed to novel coronavirus (2019-nCoV).² At the time of writing, COVID-19 or simply 'coronavirus' as it has come to be known, had claimed the lives of 23,335 humans, with a total of 509,164 cases of confirmed infection spanning 202 countries, areas or territories.³

AIDS, an ongoing pandemic caused by the HIV-1 virus identified more than three decades ago,⁴ claimed the lives of 770,000 people in 2018 alone.⁵ SARS, MERS, the 1918 flu pandemic, bird flu, swine flu, Ebola, BSE / vCJD, hantavirus and West Nile virus also had notable outbreaks in the 20th and 21st centuries with one thing in common - they are all thought to have arisen in circumstances where animal exploitation appeared to have been a contributing factor in their transmission to humans.

Any diseases that pass from animals to humans - whether as a result of exploitation or otherwise - are known as zoonotic, or zoonoses, and can involve a range of infectious pathogens including viruses, bacteria, parasites and prions. The zoonoses identified above, the ones we will chiefly be looking at, are all viral with the exception of BSE/vCJD which is thought to be caused by misfolded proteins called prions that first occurred in sheep (scrapie), then cows (BSE) before crossing over to humans (vCJD) via the consumption of infected meat.⁶

Let us also define what we mean by 'animal exploitation', as that in itself can be considered a subjective term

relating to a fringe ethical stance that some may argue has little place within a discussion of human health, drawing heavily on scientific studies of infectious diseases. For the purposes of this discussion, we will use the terms 'animal use' and 'animal exploitation' interchangeably, as while the latter is purposefully emotive, they are from an ethical and practical viewpoint effectively one and the same in that they are circumstances in which humans intentionally make use of animals for our own benefit. Examples include food (farming, hunting), trading, transport, entertainment, and the obtaining of various byproducts for clothing, cosmetics and pharmaceuticals. The definition can also be objective if we agree that use, or exploitation, is always controllable - we engage in it with intent, and therefore can also disengage with equal intent. This is important as it means that outbreaks linked to animal use AKA exploitation may be preventable or at least, more practically, reducible - but hopefully as part of a longer-term roadmap to abolition. Granted, 'exploitation' infers unfair treatment, but non-human animals do not have it within their abilities to agree to what is fair and not fair, at least not in a way we can understand - rather humans assume that we have a right to use animals, even though that use is not mutually beneficial or symbiotic, and that hardly seems fair.

When we look at flu viruses in particular, as long as we exploit animals we will have these viruses - anti-flu drugs such as Oseltamivir (Tamiflu) and Zanamivir (Relenza), which the UK government among others stockpiled in response to bird flu and swine flu, are said to have been a wasted investment,⁷ and preventative vaccination is inefficient because viruses can and do mutate or change in other ways, rendering previous vaccines useless. We see this happening every year particularly with influenza and the familiar seasonal programmes of vaccinations for what to the layperson would seem to be the same disease, but are in fact new strains. These mutations and evolutions can also occur almost anywhere - for example the swine flu pandemic

1. "Zoonotic Diseases". CDC.gov. <https://www.cdc.gov/onehealth/basics/zoonotic-diseases.html>. Accessed March 30 2020.

2. "Coronavirus (covid-19): Latest news and resources". The BMJ. <https://www.bmj.com/coronavirus>. Publication date unavailable; accessed March 27 2020.

3. "Coronavirus disease (COVID-19) Pandemic". World Health Organisation (WHO). <https://www.who.int/emergencies/diseases/novel-coronavirus-2019>. Updated March 27 2020, 16:31 GMT; accessed March 27 2020, 21:30 GMT.

4. Sharp PM, Hahn BH. "Origins of HIV and the AIDS pandemic". Cold Spring Harb Perspect Med. 2011;1(1):a006841. doi:10.1101/cshperspect.a006841 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3234451/>

5. "UN AIDS DATA 2019". UNAIDS.org. <https://www.unaids.org/en/resources/fact-sheet>. Accessed March 27 2020.

6. "About BSE". CDC.gov. <https://www.cdc.gov/prions/bse/about.html>. Accessed March 30 2020.

7. "Scientists say UK wasted £560m on flu drugs that are not proven". The Guardian. <https://www.theguardian.com/world/2014/apr/10/uk-wasted-560m-stockpiling-flu-drugs>. Published April 10 2014.

started in Mexico, but the lineage of the virus was traced back to pig farms in the United States.⁸ Also, one of the most prevalent theories about the 1918 flu pandemic is that it started in Haskell County, Kansas, where “people raised grains, poultry, cattle, and hogs”⁹ and has since been found, through more recent analysis of its viral genome, to be entirely avian in origin. It should be noted that the 2009 outbreak of swine flu - the first global flu pandemic in 40 years¹⁰ - was caused by a virus of the same H1N1 subtype that traces its genetic lineage back to 1918, albeit with the introduction since then of other swine, human, and avian viral genes to constitute a newer strain.¹¹

If by the conclusion of this paper, we can convincingly say that animal exploitation - in particular farming as the originator of many flu viruses - increases the risk of outbreaks with the potential to become pandemics, the best way of preventing loss of human life on a large scale is by eliminating animal products from our diet, as the most contact that occurs is through farms, markets and slaughterhouses. It is not just us saying

this - the WHO co-authored a report where they listed “increased demand for animal protein” as one of the main risk factors of zoonotic disease emergence.¹² However, as the global population will inevitably rise, if meat consumption also rises that means more farms and particularly ones that use intensive techniques where animals are packed in more densely. It also means more habitat destruction and encroachment into lands occupied by wild animals, which further increases the risk of zoonotic diseases being spread including those that result from unintentional contact with animals or disease carrying vectors such as mosquitoes, in the case of Zika virus.¹³

Thus it stands to reason that diseases with the potential to cause pandemics will only get worse or more frequent if we continue with the same systems we have now.

2. WHAT IS A PANDEMIC?

Although the WHO no longer officially uses the term or its former six phases of alert, favouring instead the rather more succinct and less panic-inducing *public health emergency of international concern* or PHEIC,¹⁴ colloquially ‘pandemic’ is understood to refer to a large-scale epidemic of a pathogen that spreads easily between individuals and across international boundaries. To keep things simple, we will keep to this definition with the general understanding, unless otherwise specified, that all pandemics start with localised outbreaks and epidemics before crossing enough political thresholds and infection rates to advance to pandemic level.

It is important to understand that many diseases where pathogens against which there is little or no natural or

herd immunity e.g. due to antigenic shift, are found to be infectious enough to cause a significant outbreak, if left completely unchecked have the potential to become epidemics and therefore pandemics - accounting of course for differences in the way pathogens are transmitted plus other human factors such as travel and hygiene. Even though we will focus on large-scale epidemics and pandemics, there are many well-known zoonoses that have not yet attained the dubious ascension to pandemic level, but have the potential to do so due to low inherent immunity or the absence of effective treatments and preventative or suppressive methods - these include viral hemorrhagic fevers such as Ebola¹⁵ and Machupo virus; other coronaviruses like COVID-19 such as SARS and MERS¹⁶; various

8. “Swine Flu Ancestor Born on U.S. Factory Farms”. *Wired.com*. <https://www.wired.com/2009/05/swineflufarm/>.

9. Barry JM. The site of origin of the 1918 influenza pandemic and its public health implications. *J Transl Med*. 2004;2(1):3. Published 2004 Jan 20. doi:10.1186/1479-5876-2-3 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC340389/>

10. “2009 H1N1 Pandemic Timeline”. *CDC.org*. <https://www.cdc.gov/flu/pandemic-resources/2009-pandemic-timeline.html>. Accessed March 30 2020.

11. Morens DM, Taubenberger JK, Harvey HA, Memoli MJ. The 1918 influenza pandemic: lessons for 2009 and the future. *Crit Care Med*. 2010;38(4 Suppl):e10–e20. doi:10.1097/CCM.0b013e3181ceb25b <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3180813/>

12. “Report of the WHO/FAO/OIE joint consultation on emerging zoonotic diseases”. May 2004. https://apps.who.int/iris/bitstream/handle/10665/68899/WHO_CDS_CPE_ZFK_2004.9.pdf

13. Malone RW, Homan J, Callahan MV, et al. Zika Virus: Medical Countermeasure Development Challenges. *PLoS Negl Trop Dis*. 2016;10(3):e0004530. Published 2016 Mar 2. doi:10.1371/journal.pntd.0004530 <https://pubmed.ncbi.nlm.nih.gov/26934531/>

14. “WHO says it no longer uses ‘pandemic’ category, but virus still emergency”. *Reuters.com*. <https://www.reuters.com/article/uk-china-health-who-idUKKCN20I0PD>. Published February 24 2020.

15. “Fears of Ebola pandemic if violent attacks continue in DR Congo”. *Al Jazeera*. <https://www.aljazeera.com/news/2019/05/fears-ebola-pandemic-drc-violent-attacks-continue-190522231352900.html>. Published May 23 2019.

16. “Opinion | When a danger is growing exponentially, everything looks fine until it doesn’t”. *Washington Post*. Retrieved 15 March 2020.

subtypes of influenza including bird flu¹⁷; and Zika virus.¹⁸

Some of the world's most devastating diseases throughout the centuries have been bacterial, such as plague, cholera, typhus and tuberculosis; or parasitic with transmission vectors such as malaria with its plasmodia-carrying mosquitoes. Not all were zoonotic in origin, but many of these have well established treatments or have been effectively contained through the development of powerful broad-spectrum antibiotics, effective quarantine, successful vaccination programmes, increased public hygiene, disease education and awareness, suppression strategies and

other measures.

If we listen to predictions, the unknown threats will not only be viral and therefore hard to treat both quickly and effectively, but zoonotic too, with the terrifying exception of antibiotic-resistant microorganisms or 'superbugs'. As a side note and topic for a future publication, a major driver of antibiotic resistance is animal-based food production where use of powerful antibiotics is rife.¹⁹

3. HOW DO DISEASES INFECT OTHER SPECIES?

It would seem prudent to include background information on how one disease can cross the species divide and infect, for example, both chickens and humans, or pigs and humans. The COVID-19 coronavirus is thought to have come from bats (the viral reservoirs) via pangolins as intermediary hosts before passing to humans - more on the specifics of this later.

However, despite limiting ourselves to viruses, the main focus of this paper, and further refining it down to influenza and coronaviruses, even the most basic crash course sends one down the rabbit hole of microbial science with such bewildering but fascinating terms as viral antigens, mutations, segmented genomes and gene reassortment.

Even so, let us briefly look at influenza as it relates so strongly to animal exploitation and farming in particular: it is a characteristic of the influenza virus

that its genome - that is its complete genetic blueprint - is segmented and so more easily adapted and changed. An avian strain could undergo just one change to its genetic code that allows it to bind to human cells, which if already infected with a human virus may result in a hybrid which is unrecognisable to the body's immune system. The potential to bypass herd immunity could result in a disease more infectious on an epidemic scale.

Pigs are theorised to be excellent 'mixing bowls' for new strains as their cells have receptors which can bind to both human and avian viruses, and thus this gene reassortment can give rise to as yet unknown new forms of influenza. This is of particular significance to this discussion when asking ourselves this question: where do the greatest populations of pigs, birds and humans all come into contact with the most frequency?

4. ZOOONOTIC PANDEMIC AND NOTABLE OUTBREAKS SINCE THE 1900S

What follows is almost a 'who's who' of the world's most infamous infectious diseases. Most if not all the recent outbreaks to make mainstream news headlines are here, plus a few with less impressive media profiles, yet all are zoonotic in origin. That is enough to tell us something very significant, empirically at least: people are getting sick because of our proximity to

animals. Some contact with animals is unavoidable or unintentional, and not all these diseases can be attributed to our direct exploitation of animals - some, as in the case of Zika, are transmitted via vectors such as mosquitos which do not discriminate, and in the case of influenza originating in birds, it is entirely possible for the virus to be transmitted via droppings

17. "Pandemic-causing 'Asian flu' accidentally released". New Scientist. <https://www.newscientist.com/article/dn7261-pandemic-causing-asian-flu-accidentally-released/>. Published April 13 2005.

18. "Zika virus could become 'explosive pandemic'". BBC. <https://www.bbc.co.uk/news/world-us-canada-35425731>. Published January 28 2016.

19. Tang KL, Caffrey NP, Nóbrega DB, et al. Restricting the use of antibiotics in food-producing animals and its associations with antibiotic resistance in food-producing animals and human beings: a systematic review and meta-analysis [published correction appears in Lancet Planet Health. 2017 Dec; 1 (9):e359]. Lancet Planet Health. 2017; 1 (8):e316-e327. doi:10.1016/S2542-5196(17)30141-9 <https://pubmed.ncbi.nlm.nih.gov/29387833/>

from passing birds e.g. waterfowl that find their way into the water supply or onto plant crops. For these 'non-exploitative zoonoses' - a term that likely only exists in this white paper - we will look at how other human factors may still exacerbate their spread.

1918 FLU PANDEMIC

It has proved difficult to say with any certainty where the strain of virus subtype H1N1 that caused the 1918 flu pandemic originated before going on to kill as many as 100 million people worldwide, making it one of the deadliest ever outbreaks.²⁰ In his 2004 book *The Great Influenza: The Epic Story of the Deadliest Plague in History*,²¹ author JM Barry examined a number of theories that he also summarised in an article published in the *Journal of Translational Medicine*.²² Most of the writing and epidemiological evidence uses early outbreaks to point towards possible origins, but these vary as far and wide as France and China set against the chaotic backdrop of the First World War. Barry concludes that the most likely origin was Haskell County, Kansas, an isolated and sparsely populated county, in January 1918, where people lived in close proximity to farmed animals.



Emergency hospital during influenza epidemic, Kansas c.1918
Source: National Museum of Health and Medicine

However, it would be disingenuous to claim with any certainty that the 1918 flu definitely crossed from farm animals to humans when there is so little evidence. Even so, the 1918 H1N1 strain has made it into this discussion partly because of the severity of the pandemic and the fact it was zoonotic, but also because a later different strain of H1N1 would give rise to another pandemic

nearly a century later for which there was evidence of cross-over from domesticated pigs to humans - the outbreak of swine flu in 2009.²³

HIV / AIDS (1981)

The first verified case of Human Immunodeficiency Virus (HIV) is from a blood sample taken in 1959 from a man living in what is now Kinshasa in the Democratic Republic of Congo, but it wasn't until the 1980s that HIV and AIDS was officially recognised and named. Cases of rare diseases including cancers and lung infections were recorded in New York and California in 1981, before spreading and leading to the conclusion that they were due to an unknown infectious disease. It is for this reason that many attribute the HIV/AIDS outbreak to America in 1981, even though HIV is thought to have originated in the Congo.

They are the subjects of much debate and research, but the most commonly accepted theories of how the AIDS-causing viruses HIV-1 and HIV-2 crossed over from chimpanzees (as SIVcpz) and sooty mangabey monkeys (as SIVsmm) respectively, both point to the hunting, butchering and consumption of these animals.²⁴

The believed link between animal exploitation and the origin HIV/AIDS is clear. As zoonotic transmission must occur through contact with infected blood or bodily fluids, we must ask ourselves how likely it would have been for the two forms of Simian Immunodeficiency Virus (SIVcpz and SIVsmm) to cross over to humans in any other circumstance. Even though there is always much talk of a 'patient zero' in regards to outbreaks, this gives the impression that they all start linearly from just one case. In fact, once a zoonotic virus mutates and takes a hold in humans, there can be many cases that happen in relative isolation before the right human factors occur that lead to an epidemic.

Hunting of chimpanzees and monkeys is, or at least was at the time, prevalent enough to have brought humans into more frequent contact not just with SIV-infected animal fluids, but also other HIV-infected humans through the communities and secondary livelihoods that are associated with hunting. It is postulated that hunters exposed cuts and wounds directly to SIV

20. Jilani, TN; Jamil, RT; Siddiqui, AH (14 December 2019). "H1N1 Influenza (Swine Flu)". PMID 30020613. Archived from the original on 12 March 2020. Retrieved 11 March 2020.

21. "The Great Influenza: The Epic Story of the Deadliest Plague in History". Barry JM, 2004. [Google Scholar](#).

22. Barry JM 2004

23. Fox M. "New flu has been around for years in pigs - study". <https://www.reuters.com/article/idUSN11399103>. Published June 11 2009.

24. "Origin of HIV & AIDS". Avert.org. https://www.avert.org/professionals/history-hiv-aids/origin#footnote5_aa1k1e2. Accessed April 1 2020.

particularly when butchering the animals.²⁵ It is not impossible that someone could have inadvertently exposed a cut or wound to infected animal fluids by some freak occurrence, leading to the genesis of HIV from SIV, but it is not unreasonable to postulate that the conditions leading up to the start of the HIV epidemic and pandemic would have been less lightly to occur without hunting and butchering - not just the actual transmission of the zoonoses, but the increased human factors resulting in an outbreak of sufficient magnitude to one day result in a global pandemic that has claimed many millions of lives.



*HIV is thought to have crossed over to humans from the killing and butchering of chimpanzees and monkeys infected with SIV.
Photograph: Amr Miqdadi/Pexels*

BSE / VCJD (1986)

Bovine Spongiform Encephalopathy (BSE), otherwise known as mad cow disease, is a progressive neurological disorder of cows that results from infection by an unusual pathogenic form of a misfolded protein called a prion. Research shows that the most probable first infections of BSE occurred in the 1970s, the result of feeding cows BSE-infected meat and bone from a "spontaneously occurring case of BSE or scrapie-infected sheep products,"²⁶ scrapie being a prion

disease of sheep. There is further agreement that the outbreak was then worsened throughout the UK cattle farming industry by the feeding of prion-infected bovine meat-and-bone meal to calves.²⁷

The human disease known as variant Creutzfeldt-Jakob disease (vCJD is believed to be causally associated with BSE, based on epidemiological and laboratory evidence, according to some sources, and directly acquired by eating BSE-infected meat according to others.²⁸

If the agreed origin of BSE / vCJD is true, farming is directly responsible. In the absence of farming, unless the prions responsible can be passed some other way than by ingesting infected body parts, it seems very unlikely that herbivorous cows would have contracted BSE from ingesting sheep parts, and that it would then be further spread without forced cannibalisation between cows. There is always the possibility, but the odds of it happening without human intervention - for example if a sheep that had died from scrapie found its way into a cow's water supply, and then that cow died from BSE and got into a cattle farm's water supply to infect others in its herd - must be far lower.

Of course, the transmission of BSE to humans as vCJD would also be extremely unlikely if we did not eat cows.

BIRD FLU (1997, 2004)

Referred to commonly as avian influenza or just bird flu, the highly pathogenic form of the H5N1 subtype of influenza is one of the more well-known zoonotic diseases to make media headlines and cause widespread public alarm. Although media-induced hysteria is never a good thing, it would seem there is good reason for experts and health authorities to recommend research into effective treatments and preparations for a global pandemic with a significant impact on public health worldwide.

The main strain is considered an avian virus that can infect humans, with around a 50% mortality rate, rather than being a human virus and as such there is only limited evidence for human-to-human transmission.²⁹ However, it is influenza's ability to more readily mutate

25. Avert.org

26. "About BSE". CDC.gov. <https://www.cdc.gov/prions/bse/about.html>. Accessed April 1 2020.

27. "About BSE". CDC.gov.

28. "Creutzfeldt-Jakob Disease Fact Sheet", NINDS, Publication date May 2018. NIH Publication No. 18-NS-2760 <https://www.ninds.nih.gov/Disorders/Patient-Caregiver-Education/Fact-Sheets/Creutzfeldt-Jakob-Disease-Fact-Sheet>

29. Ortiz JR, Katz MA, Mahmoud MN, et al. "Lack of evidence of avian-to-human transmission of avian influenza A (H5N1) virus among poultry workers, Kano, Nigeria, 2006". *J Infect Dis.* 2007;196(11):1685-1691. doi:10.1086/522158 <https://pubmed.ncbi.nlm.nih.gov/18008254/>

that has experts wondering what the future will bring, with research showing that a small change in just one amino acid had resulted in a form of H5N1 that was able to bind to the same receptors as human flu viruses.³⁰

Although H5N1 can infect many different species of birds, including migratory ducks, geese and swans, it is mainly transmitted by domestic poultry, particularly chickens. The 1997 outbreak in Hong Kong was halted by the culling of its entire population of farmed poultry.

Had anything other than poultry farming been a significant factor in humans contracting H5N1, killing farmed chickens would not have been as effective. Surely then it follows that abolishing poultry farming would drastically reduce the harm to humans, and with fewer avian hosts, also reduce the occurrences of mutations - any one of which could result in more virulent new strains that are more pathogenic in humans and against which we have no immunity, treatments or effective delay and mitigation measures.

NIPAH VIRUS (1998) AND HENDRA VIRUS (1994)

Nipah virus belongs to the Henipavirus genus along with Hendra virus, another zoonotic disease that has caused deaths in Australia after crossing from infected bats, to horses and then to humans. However, unlike Hendra, Nipah has a strong association with animal agriculture, specifically pig farming in peninsular Malaysia in 1998 and 1999.³¹

With human-to-human transmission having been documented, the WHO also lists Nipah virus among its prioritised diseases for research and development in the context of public health emergencies - together with COVID-19, Ebola, SARS, MERS and Zika³² - and attributes its transmission to "unprotected exposure to secretions from the pigs, or unprotected contact with the tissue of a sick animal".³³

Both Nipah and Hendra are believed to originate in pteropid fruit bats (flying foxes): in Malaysia, Nipah-

infected bats came into contact with piggeries; and in Australia, it is believed bats with Hendra transmitted the virus to horses via saliva from chewed up fruit that was dropped down onto grass where the horses grazed. Hendra has claimed the lives of handlers and owners of horses.



The Malaysian Nipah outbreak in 1998 spread from fruit bats to pigs and then to humans. The epidemic was finally stopped by mass culling of pigs. Photograph: Jo-Anne McArthur / We Animals for The Guardian

Land use and animal husbandry practices, and the ecological changes they bring about, are thought to be associated with outbreaks of both viruses.³⁴ In Malaysia, in an attempt to suppress the outbreak of Nipah virus, one million pigs were culled, while in Australia, around 90 horses have been euthanised due to confirmed or suspected Hendra infection.

Both Nipah and Hendra have been listed as Category C on the CDC list of Bioterrorism Agents/Diseases as pathogens that could be easily engineered, produced and spread, with potentially high mortality rates and major health impacts.³⁵

SARS (2002)

Severe acute respiratory syndrome (SARS) - another of the big pandemic threats to make headlines in the early 2000s around the same time as the later outbreaks of bird flu - is caused by the SARS-CoV virus. Like its 'cousin' SARS-CoV-2 which causes the similar respiratory affliction COVID-19, the SARS virus has been genetically traced back to bats in China albeit with civets in so-called wet markets acting as animal-

30. Gambaryan A, Tuzikov A, Pazyrina G, Bovin N, Balish A, Klimov A. "Evolution of the receptor binding phenotype of influenza A (H5) viruses". *Virology*. 2006;344(2):432-438. doi:10.1016/j.virol.2005.08.035 <https://pubmed.ncbi.nlm.nih.gov/16226289/>

31. Mohd Nor MN1, Gan CH, Ong B. "Nipah virus infection of pigs in peninsular Malaysia". *Rev Sci Tech*. Published April 19 2000. <https://www.ncbi.nlm.nih.gov/pubmed/11189713>

32. "Prioritizing diseases for research and development in emergency contexts". WHO. <https://www.who.int/activities/prioritizing-diseases-for-research-and-development-in-emergency-contexts>.

33. "Nipah virus infection". WHO. <https://www.who.int/csr/disease/nipah/en/>. Accessed April 1 2020

34. Field H, Young P, Yob JM, Mills J, Hall L, Mackenzie J. The natural history of Hendra and Nipah viruses. *Microbes Infect*. 2001;3(4):307-314. doi:10.1016/s1286-4579(01)01384-3 <https://pubmed.ncbi.nlm.nih.gov/11334748/>

35. "Bioterrorism Agents/Diseases". CDC; archived July 22 2014.

to-human intermediary rather than pangolins.^{36,37}

Wet markets such as the ones linked to SARS in the Guangdong Province in southern China, and in the case of COVID-19, Wuhan City in the central Hubei Province, are places where many different live and dead animals are sold. Live animals are slaughtered on site, differentiating them from 'dry' markets. The often unsanitary conditions, lack of regulation in regards to how the animals are kept and killed, and close proximity to humans of wild and domesticated animals who would never normally mix, has made them a breeding ground for at least two devastating viral outbreaks.³⁸

Can it be said that the SARS virus would have emerged and infected humans without wet markets and the trading of wild animals? Some reports say the infected bats were also present at the markets along with the palm civets that acted as intermediary, but it may be possible that those civets were exposed to the bat virus elsewhere. However, it is important to note that many of the so-called wild animals traded at wet markets are in fact farmed, including pangolins and civets, albeit on a small scale.³⁹ For the SARS virus to have occurred 'naturally' in the absence of any intentional exploitation, bats and humans plus an intermediary animal would have had to encounter each other in the wild, and not in a market or small-scale farm.

To add more weight to this argument, a ban on the trading of wildlife imposed in an attempt to curb the SARS outbreak was seemingly effective, with no further human cases reported in Guangdong.⁴⁰

SWINE FLU (2009)

Prior to COVID-19, the 2009 swine flu pandemic was arguably the last major outbreak to cause international concern, with as much as 21 percent of the world's population - or one in five people on the planet - having been infected with the strain of H1N1 virus responsible, according to one study.⁴¹ The WHO

confirmed 18,036 deaths, while the CDC estimated 150,000-575,000.

Although there is a conflicting and admittedly 'sketchy' claim that the swine flu pandemic arose in Asia with no mention of the role of domesticated pigs,⁴² possibly as an attempt to absolve North American farming, the first human case of Pandemic H1N1/09 was recorded in Mexico in early 2009.



Arrivals at Singapore airport being scanned for fever in response to swine flu, 2009. Photograph: Jnpet/Creative Commons

Researchers from the Mount Sinai School of Medicine, authors of one of the more recent studies into the origin of pandemic swine flu, said that small areas with pig farms cannot be ignored and may give rise to more severe global flu.⁴³ Investigations into the genetic sequence of the virus conducted by researchers at the University of Edinburgh, Oxford University and University of Hong Kong in 2009, said the pandemic had provided further evidence of the role of domestic pigs, with several ancestral viruses having likely circulated in farms for years before mixing genes to create the pandemic strain. This was further evidenced by the discovery of swine, human and avian-like genetic sequences.⁴⁴

EBOLA

There have been many outbreaks of Ebola recorded

36. "Scientists trace 2002 Sars virus to colony of cave-dwelling bats in China". The Guardian. <https://www.theguardian.com/world/2017/dec/10/sars-virus-bats-china-severe-acute-respiratory-syndrome>. Published December 10 2017.

37. Haagmans BL, Osterhaus A. "Vaccines for Biodefense and Emerging and Neglected Diseases". 2009. Chpt 36 SARS, p672. [Link](#).

38. Dalton J. "From coronavirus to antibiotics: the ways we use animals 'still risks spreading disease'". The Independent. <https://www.independent.co.uk/news/health/coronavirus-antibiotics-wild-animals-wildlife-china-wuhan-bat-pangolin-a9407261.html>. Published March 18 2020.

39. Standaert M. "Coronavirus closures reveal vast scale of China's secretive wildlife farm industry". The Guardian. <https://www.theguardian.com/environment/2020/feb/25/coronavirus-closures-reveal-vast-scale-of-chinas-secretive-wildlife-farm-industry>. Published February 25 2020.

40. Boncristiani HF, Arruda E, Criado MF. "Respiratory Viruses". Encyclopedia of Microbiology (Third Edition), 2009. [Link](#).

41. Roos R. "Study puts global 2009 H1N1 infection rate at 11% to 21%". Center for Infectious Disease Research and Policy. August 8 2011. <http://www.cidrap.umn.edu/news-perspective/2011/08/study-puts-global-2009-h1n1-infection-rate-11-21>

42. McNeil Jr DG. "In New Theory, Swine Flu Started in Asia, Not Mexico". <https://www.nytimes.com/2009/06/24/health/24flu.html>. Published June 23 2009.

43. The Mount Sinai Hospital / Mount Sinai School of Medicine. "2009 swine flu pandemic originated in Mexico, researchers discover". ScienceDaily. www.sciencedaily.com/releases/2016/06/160627160935.htm. June 27 2016.

44. Fox M. "New flu has been around for years in pigs - study". <https://www.reuters.com/article/idUSN11399103>. Published June 11 2009.

since 1976, but one that began in Guinea in 2013 and ended in 2016 killed more than 11,000 people to make it one of the most severe and deadliest. At the time of writing, the most recent outbreak is still ongoing and has claimed the lives of 2,200 people across the Democratic Republic of Congo and Uganda.

Ebola Virus Disease (EBV) is a viral hemorrhagic fever that is in fact caused by four viruses of the genus *Ebolavirus*, but the most dangerous is simply called Ebola virus (EBOV). The virus's natural reservoir - that is the animal or animals in which it survives and thrives in nature, usually without causing any harm - is thought to be several species of fruit bats. Monkeys, chimpanzees, gorillas, baboons, dogs and pigs may all be susceptible to EBOV infection.



Scanning electron microscopic image of Ebola virions. Creative Commons

Health authorities have placed most of the blame on the prevalence of bushmeat in affected regions, which comes from various wild animals hunted for food including several of the at-risk primates and, most importantly in the case of Ebola, bats.

Without this form of hunting and consumption of bats and other infected animals, EBOV would be unlikely to cross the species gap and gain a foothold in human populations, although it may be possible through contact with blood. It is just far less likely to happen that way, relatively, given the scale of the bushmeat trade.

Attempts have been made to reduce the practice, either through restrictions or education programmes, but given the challenges that agriculture of any sort faces in areas where bushmeat is rife, alternative sources of protein are harder to come by and are less affordable than in other parts of the world.

It is easy for us to call for an end to the hunting of wild animals for bushmeat, but it is unlikely to happen if we do not also address the broader issues - everything from the absence of arable land and water for irrigation, to a lack of political will and accessible education. For this reason, without shying away too much from the role hunting has played in both Ebola and HIV/AIDS, in concluding this discussion we will focus more on zoonotic diseases arising from farming in places where alternative foods are more available and affordable, and where consumers have more influence.

COVID-19 (2019)

The coronavirus family includes viruses that cause some instances of the more run-of-the-mill common cold (along with rhinoviruses), but some coronaviruses cause MERS, SARS and the current Coronavirus Disease 2019 (COVID-19) pandemic.

The outbreak of the COVID-19 virus - SARS-CoV-2 - is, like SARS, thought to have originated from a wet market in China, in Wuhan City in central Hubei Province where pangolins carried the virus before it crossed over to humans.⁴⁵ Other theories currently being debated include whether pigs were the intermediaries rather than pangolins, or even that the virus evolved within humans, passing between hosts undetected over an extended period of time prior to gaining its pandemic characteristics.^{46,47} The pig theory would shift blame over from wet markets to intensive, industrial farming which of course is almost ubiquitous by comparison.

Also, just as with SARS, all the same arguments apply in regards to the much lower likelihood of COVID-19 occurring without the inter-species mixing bowls that are wet markets, combined with an unchecked trade based on the farming of wild animals.^{48,49} Calls to make permanent the temporary ban on wildlife markets - not just by those of us who value the rights of animals,

45. "Event background COVID-19". European Centre for Disease Prevention and Control. <https://www.ecdc.europa.eu/en/novel-coronavirus/event-background-2019>. Accessed April 2 2020.

46. "Origin of Covid-19: industrial livestock?". LocalFutures.org. <https://www.localfutures.org/origin-of-covid-19-industrial-livestock/>. Published April 7 2020.

47. Andersen, K.G., Rambaut, A., Lipkin, W.I. et al. The proximal origin of SARS-CoV-2. *Nat Med* 26, 450–452 (2020). <https://doi.org/10.1038/s41591-020-0820-9>

48. Dalton J. "From coronavirus to antibiotics: the ways we use animals 'still risks spreading disease'". *The Independent*. <https://www.independent.co.uk/news/health/coronavirus-antibiotics-wild-animals-wildlife-china-wuhan-bat-pangolin-a9407261.html>. Published March 18 2020.

49. Standaert M. "Coronavirus closures reveal vast scale of China's secretive wildlife farm industry". *The Guardian*. <https://www.theguardian.com/environment/2020/feb/25/coronavirus-closures-reveal-vast-scale-of-chinas-secretive-wildlife-farm-industry>. Published February 25 2020.

but health and conservation experts too - should also be an indicator of just how much this facet of animal exploitation is contributing to global crises.⁵⁰

COVID-19 may have put the entire world seemingly into lockdown and affected lives and entire societies on an unprecedented scale, but to consider it in isolation leads us to blame everything on China. In fact, coronavirus is just the latest in a long line of zoonotic diseases that originate and resurface as new outbreaks all over the world.

Antibiotic resistant bacteria and rapidly mutating influenza viruses pose far greater threats, and they are just as likely to come out of the West as the East.

OTHER NOTABLE ZOOONOTIC OUTBREAKS

There are other contemporary outbreaks that are zoonotic in origin, but that have more tenuous links to animal exploitation such as Bolivian hemorrhagic fever (BHF) / Machupo virus, West Nile virus and Zika virus, some of which are transmitted by mosquitoes and other vectors. It can be argued however that population growth and the demand for greater food production and other resources drives human expansion into previously wild habitats where disease-carrying vectors are present in greater numbers, or that we create their ideal conditions through inadequate sanitation and infrastructure. In this sense, it is not our direct exploitation of animals that is our downfall, but rather our exploitation of the planet and the knock-on effects on animals.

5. GLOBALISATION, CLIMATE CHANGE AND OTHER HUMAN PRESSURES

Even without direct links to animal farming and other forms of animal exploitation, habitat encroachment and globalisation have all played their part in intensifying or increasing the risk and prevalence of outbreaks. Taking Zika as our example, it is not known why exactly it became a pandemic threat in 2007, giving rise to the more recent epidemics in the Americas in 2016, but it is speculated that like dengue, a related arbovirus that infects the same species of mosquito, Zika is intensified by urbanisation and globalisation - this stands to reason given that Zika was first isolated in

There were also more influenza pandemics during the 20th century than mentioned above, with 1918-19 "Spanish Flu" (H1N1) the most severe at an estimated 20-50 million deaths. Milder pandemics occurred later: so-called "Asian Flu" in 1957-58, caused by the H2N2 virus; and "Hong Kong Flu" in 1968 caused by the H3N2 virus, a descendant of H2N2. Both were estimated to have caused 1-4 million deaths each, and both H2N2 and H3N2 have genetic segments from avian influenza.

MERS (Middle East respiratory syndrome), a coronavirus like SARS and COVID-19 and first identified in Saudi Arabia in 2012, is thought to come from camels. Advice has been issued to eat only fully cooked camel flesh and pasteurised camel milk, as well as wear masks around them.⁵¹ Camels are raised and farmed in Saudi Arabia for their meat, but have also been imported from North Africa and Australia.⁵²

Lastly there is Marburg virus, linked to African fruit bats but able to pass from human-to-human. However, the first human outbreak in 1967 was attributed to infected monkeys imported into Germany from Uganda - ironically, those grivet monkeys were used in laboratory research aimed at developing treatments against other diseases.⁵³ Marburg makes the list as the WHO, National Institutes of Health (NIH) and CDC have all ranked the virus as either extremely dangerous, a high priority pathogen or a bioterrorism threat in the same category as anthrax, plague and smallpox.

the Ziika Forest of Uganda in 1947 before spreading across equatorial Africa to Asia and Micronesia during the last half of the 20th century and 2000s, before being recorded in Oceania and the Americas in 2013 onwards.

Some may even say that Zika has tracked the steady pace of globalisation, taking some 70 years to move from Africa to the Americas via the Pacific. Dengue is a similar virus also transmitted by mosquitoes that has shown movement around the world, but its occurrences

50. Weston P. "Make ban on Chinese wildlife markets permanent, says environment expert". The Guardian. <https://www.theguardian.com/environment/2020/jan/30/make-coronavirus-ban-on-chinese-wildlife-markets-permanent-says-environment-expert-aoe>. Published January 20 2020.

51. "Mers virus: Saudis warned to wear masks near camels". BBC News. 11 May 2014. <https://www.bbc.co.uk/news/world-middle-east-27362513>

52. "Australia supplies Saudis with camels". BBC News. June 11 2004. http://news.bbc.co.uk/1/hi/world/middle_east/2038834.stm

53. "Marburg Hemorrhagic Fever (Marburg HF) | CDC". CDC.gov. February 25 2019. <https://www.cdc.gov/vhf/marburg/index.html>

are mostly limited to equatorial regions where it is hotter. Even dengue's preference for more temperate climates may not limit it forever - global warming, another human-influenced factor, may be opening up new territory to the virus.⁵⁴

It is a simple fact that the human population is not only growing, but moving around like never before - to sustain this we need more food, land and resources. The more people there are on this planet, the more pressure we'll place on the environment and those with whom we share it. As we cut down rainforests to create grazing land for cattle or soy plantations for animal feed, humans will come into contact with animals carrying zoonotic diseases. As we expand our urban centres, search for new resources or

increase our agricultural footprint, we will encounter zoonotic diseases. We are even making more of the planet warmer and more hospitable, in the case of dengue. We have seen this countless times in the past as discussed above, and with mutations and the emergence of as yet unknown pathogens, we will see it happen countless more times in the future.

We cannot realistically halt the growth of the world's human population, or limit climate change, but we can alter our food consumption and farming practices.

6. CONCLUSION: THE CASE FOR ABOLISHING ANIMAL AGRICULTURE AND PANDEMIC MITIGATION

Despite the profound effect COVID-19 is having on our way of life, precious few seem to be looking at how we all contributed to the rise of this latest pandemic. It is very easy to blame China for COVID-19 and its cousin SARS, both coronaviruses linked to wet markets, and label the Chinese people horrific for eating wild animals, but zoom out to the bigger picture and it seems undeniable that the way we interact with all animals is the far greater problem.

So many of the world's deadliest outbreaks of the past 120 years have had some link to animals, and a good proportion of those are directly linked to farming, yet we aren't willing to ask whether future zoonotic diseases can be prevented or the risk at least greatly mitigated by moving to alternative, plant-based food systems.

"It is estimated that, globally, about one billion cases of human illness and millions of deaths occur every year from zoonoses," said Amanda Fine and Aili Kang from the Wildlife Conservation Society (WCS) in an [article published on Medium.com](#). "Some 60 percent of emerging infectious diseases that are reported globally are zoonoses and of the more than 30 new human pathogens detected in the last three decades, 75 percent have originated in animals."

We only need look at the World Health Organisation's [list of diseases](#) for which we should be prioritising all research:

- COVID-19
- Crimean-Congo haemorrhagic fever
- Ebola virus disease and Marburg virus disease
- Lassa fever
- Middle East respiratory syndrome coronavirus (MERS-CoV) and Severe Acute Respiratory Syndrome (SARS)
- Nipah and henipaviral diseases
- Rift Valley fever
- Zika
- "Disease X"

Of the eight of these known diseases, **all are zoonotic**. Six are associated with animal exploitation of some kind; four are from eating animals and three are from modern farming of domestic pigs or poultry. Of the ninth and last on the list, "Disease X represents the knowledge that a serious international epidemic could be caused by a pathogen currently unknown to cause human disease" - consider one last time that all the others on the list are viruses from animals, but also that Disease X could very well be an antibiotic-resistant bacterium arising from intensive farming practices that make regular, systematic use of antibiotics to prevent sickness rather than treat it. Such a bacterium could render even the most powerful antibiotics entirely useless.

54. Whitehorn J, Farrar J. "Dengue". British Medical Bulletin, Vol. 95, Issue 1, September 2010, P161 - 173. <https://doi.org/10.1093/bmb/ldq019>

THE RIGHT QUESTION AT THE WRONG TIME?

Perhaps we are asking this question too soon, or being insensitive in not allowing those who consume and use animals to turn a blind eye to the reality of the situation and carry on guilt-free. The messaging being put out there right now by animal rights activists and advocates of veganism is either falling on deaf ears or being met with outright hostility and accusations of callously advancing an 'agenda' while people are dying. Yet influenza viruses like swine flu and bird flu, which have killed and infected many thousands, are linked to intensive farming where huge populations of chickens and pigs are raised to live around each other in bewildering numbers and densities. It is not just for the lives of animals that activists are saying these things - human lives can be saved if we remove the environments that lead to the frequent emergence of new disease-causing pathogens.

The H1N1 swine flu virus has been found to contain pig, avian and human viral genes helping it to bypass much of the herd immunity that might have remained in the world's population after the 1918 flu pandemic in which a related strain of the same H1N1 viral subtype killed more people in 24 weeks than HIV/AIDS has killed in 24 years.⁵⁵

"Worldwide surveillance of active flu in pigs is crucial because swine are a common global commodity," said Dr Garcia-Sastre, who led a team of researchers from the Mount Sinai School of Medicine studying swine flu in 2016. "We need to monitor the viruses that are circulating, and try to stop mixing influenza strains from different geographic locations [...] This study also shows that you cannot ignore small geographic areas with pig farms - places in which the 2009 pandemic originated and which the next, perhaps more severe global flu, may come from."

SLOWING THE RATE OF EMERGENCE

Even if it is impossible to entirely cut the risk of new zoonotic diseases arising in human populations through unintentional contact with animals either infected or acting as viral reservoirs, there is still a compelling case for switching to plant-based food systems in that we can at least slow the rate at which new zoonoses emerge. We can do away with the unhygienic petri dishes that are chicken and pig sheds, and reduce the chances of wild birds passing infections to domestic poultry and then on to pigs and humans. Fewer animal hosts means fewer opportunities for viral mutation, any

one of which could allow a new virus to take hold in humans, mix with human viral genes, become more easily transmissible, perhaps survive on surfaces for longer, harm the body in a different or quicker way, have a higher mortality rate among young as well as old, or any combination of these to devastating effect.

By slowing the emergence of these unknown diseases, we give doctors and scientists working in the fields of microbiology and infectious diseases more time to research and devise treatments, and public health bodies more time to come up with effective mitigation, delay and suppression measures for future outbreaks, or if a new disease does emerge, it would be longer until the next one comes along. Just looking at the outbreaks we have chosen to explore above, we can see that notable epidemics and pandemics are occurring more frequently - we would only be speculating further as to why this might be, but a rapidly growing population, urbanisation, even climate change will all be adding to the pressures to increase food production which invariably will require more land, resources and the generating of more greenhouse gas emissions.

"More than 300,000 viruses are estimated to await discovery in mammals, many of them bearing zoonotic potential. In the U.S.-funded PREDICT program, researchers estimate that there are more than 1.6 million unknown viral species in mammals and birds, 700,000 of which could pose a disease risk to humans, based on years of information gathering," the WCS claimed. "Facing such a vast, unknown and unpredictable universe of zoonotic agents, we firmly believe that limiting the chances of contact between human and wild animals is the most effective way to reduce the risk of emergence of new zoonotic diseases."

ABOLITION: A PROVEN PANDEMIC MEASURE?

Even with relatively contained outbreaks like bird flu in Hong Kong, we saw entire populations of farmed poultry culled in an attempt to stop the spread. It worked, but those birds need not have had to die had they not been raised for food in the first place, nor would they have unintentionally spread disease. In the case of Hendra virus, herds of horses were culled, and with SARS and COVID-19, bans on market trade were also effective in mitigating cases of infection. When the next big zoonotic flu virus emerges, health authorities will consider again whether or not to remove the populations of animal hosts, yet without realising it, they will be enacting what is essentially the abolition of animal exploitation, albeit temporarily. A ban on

55. "The Great Influenza: The Epic Story of the Deadliest Plague in History". Barry JM, 2004. [Google Scholar](#).

FARMING AND THE DEMAND FOR PROTEIN

wet markets and trade is to all intents and purposes the partial abolition of animal exploitation. Removal of populations of domesticated animals is the abolition of animal exploitation in a localised and very specific circumstance. All for the good of public health and to save lives - they just choose not to enforce that abolition indefinitely.

Why abolish animal use reactively, when we should be proactively preventing future pandemics with unforeseeable death tolls? Nipah virus, BSE/vCJD, bird flu, swine flu, SARS, COVID-19 - they could all be nothing more than tasters of what is to come.

CREATING THE PERFECT CONDITIONS

Writing in Huffpost in 2016, neurologist, public health specialist and author Aysha Akhtar said: "By creating distressed and sick animals, we are also harming humankind. Nowhere is this more apparent than in the massive production of animals for meat, eggs, and dairy. If viruses, bacteria and parasites could tell us about their ideal environments, we would hear them describing animal agriculture among their top choices.

"For every human on this planet, there are about ten land animals raised and killed for food at any one time [...] the intensive confinement of animals for food is directly responsible for the explosion of deadly new strains of bird and swine flus."

As for HIV/AIDS, Ebola and other diseases that have less to do with intensive farming and more to do with culture and way of life in less developed parts of the world, the need for bushmeat or urbanisation and habitat encroachment mean infected animals are regularly eaten. Humans also come into contact more with mosquitos, mice, rats and other disease vectors. Neither of these are factors where we can expect change on the individual or even socio-political levels - or rather the education and steps necessary to bring about the necessary changes are interwoven with too many other issues. Saying that, we must be mindful that pathogens have and may again emerge from those environments especially where farming is exerting other pressures such as deforestation and habitat destruction that is bringing human populations in closer contact with environments more favourable for mosquitoes, rats and mice.

MERS, SARS and COVID-19 all hint at another human factor that we have not yet discussed, which is aiding the rise of new, emerging diseases and equally the responsibility of developing and developed nations alike: the international trade in wild animals for food, exotic pets, clothing and entertainment. In discussing MERS, we revealed that Saudi Arabia had imported camels from Australia. Other animals exported to become pets could carry with them unknown pathogens - they could be reservoirs or carriers and show no symptoms. Imported birds could bring with them new avian viral strains that could find their way into domestic poultry populations.

However, as a closing call-to-action, it seems more realistic to look towards intensive food production in the developed world as the first thing we can change that would have the greatest impact in regards to both influenza and antibiotic resistance. Plant diseases - fungi, bacteria, phytoplasma, viruses, viroids, nematodes and other agents - simply are not infectious to humans,⁵⁶ and certainly not to the degree that they could cause a pandemic. E.coli and salmonella, reportedly passed to humans in vegetables, got there via water supplies tainted with infected animal waste from nearby farms or waste from passing birds.

The WHO, FAO and OIE all say that "increasing demand for animal protein" is one of the main risk factors for the emergence of zoonotic diseases. Governments and health authorities must listen and work with the farming industry to move away from animal-based food production and towards sustainable plant-based food systems. Existing technologies should be developed, or new ones pioneered, to bring plant agriculture to environments where bushmeat is currently the only option for families.

IMMINENT THREAT

It is not a case of if a devastating new virus will emerge, but when. The answer to that could be sooner than you imagined - bird flu, SARS and swine flu all saw major outbreaks within a seven-year period between 2002 and 2009, averaging around one every two years. As for likely viral Disease X candidates, there is a highly pathogenic strain of avian influenza - H7N9 - which

56. Al-Sadi AM. "Impact of Plant Diseases on Human Health". Int J Nutr Pharmacol Neurol Dis. Cited 2020 Apr 21. [Link](#).

was found in live poultry markets and linked to 130 cases of infection and 40 deaths in China in 2013.^{57,58} With a mortality rate as high as 40% - many times greater than COVID-19 - the WHO has identified H7N9 as "an unusually dangerous virus for humans".

If not H7N9, then consider H5N9, a strain of bird flu that has taken genes from H7N9, H5N1 and H9N2, some highly pathogenic.⁵⁹ Other strains of avian influenza to ring public health alarm bells include H16N3, H10N8 and H6N1 with scientific eyes yet again cast in the direction of live markets.^{60,61,62}

At the time of writing this paper, headlines are emerging about African Swine Fever (ASF) which has wiped out 40% of China's farmed pigs and is now emerging in Poland.⁶³ Although the virus responsible (ASFV) does not infect humans, according to the head of the Russian Epidemiology Service, Doctor Gennady Onishchenko, it has the potential to cross the species divide:

"If we take into account the fact that pig physiology is very close to human physiology, and they suffer illness in almost the same way as we do, there is reason to believe that in the next round of mutation the virus can become dangerous to humans," said Dr Onishchenko, as reported by industry press Pig Progress.⁶⁴

It is not only when, but how many times will it have to happen before we finally understand that raising animals for food has the potential to kill humans on a bewildering scale and in a short space of time. This is not just the usual health implications of eating animals that we are talking about like heart disease and type 2 diabetes - a zoonotic pathogen can claim a life within days or weeks of infection.

We must act now to save lives in the future and prevent the next global pandemic.



Chickens being unloaded from trucks at a slaughterhouse, 2019.
Photograph: Jo-Anne McArthur / We Animals

57. Yu X, Jin T, Cui Y, et al. "Influenza H7N9 and H9N2 viruses: coexistence in poultry linked to human H7N9 infection and genome characteristics". J Virol. 2014;88(6):3423-3431. doi:10.1128/JVI.02059-13

58. Lam TT, Wang J, Shen Y, et al. "The genesis and source of the H7N9 influenza viruses causing human infections in China". Nature. 2013;502(7470):241-244. doi:10.1038/nature12515

59. Yu Y, Wang X, Jin T, et al. "Newly Emergent Highly Pathogenic H5N9 Subtype Avian Influenza A Virus". J Virol. 2015;89(17):8806-8815. doi:10.1128/JVI.00653-15

60. Li, Y, Li, M, Tian, J, et al. "Characteristics of the first H16N3 subtype influenza A viruses isolated in western China". Transbound Emerg Dis. 2020; 00: 1- 11.

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62. "Establishment of Influenza A Virus (H6N1) in Minor Poultry Species in Southern China". C. L. Cheung, D. Vijaykrishna, G. J. D. Smith, X. H. Fan, J. X. Zhang, J. Bahl, L. Duan, K. Huang, H. Tai, J. Wang, L. L. M. Poon, J. S. M. Peiris, H. Chen, Y. Guan. Journal of Virology Sep 2007, 81 (19) 10402-10412; DOI: 10.1128/JVI.01157-07

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**FIND OUT MORE ABOUT HUMANITY'S ROLE IN THE
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WHAT CAN YOU DO

- 1. SHARE THIS WHITE PAPER AND OUR VIDEOS WITH YOUR FRIENDS, FAMILY, CO-WORKERS, OR ANYONE WHO YOU FEEL NEEDS TO READ IN GREATER DEPTH THE TRUTH ABOUT PANDEMICS.**
- 2. WRITE AN EMAIL TO YOUR LOCAL POLITICIAN OR ELECTED GOVERNMENT REPRESENTATIVE DEMANDING THAT THEY RAISE THESE ISSUES FOR LOCAL AND NATIONAL DEBATE.**
- 3. SHARE THE WARNINGS ISSUED BY THE WORLD HEALTH ORGANISATION AND OTHER INTERNATIONAL HEALTH AUTHORITIES ABOUT THE PANDEMIC THREAT POSED BY ZOOONOTIC DISEASES AND OUR DEMAND FOR ANIMAL PROTIEIN.**
- 4. FOLLOW SURGE ON SOCIAL MEDIA FOR UPDATES ON UPCOMING CAMPAIGNS BASED AROUND PANDEMIC THREATS.**

RECOMMENDED VIDEOS

THE DISCLOSURE PODCAST - CAN WE STOP A FUTURE PANDEMIC? DR. MICHAEL GREGER M.D EXPLAINS WHAT'S NEXT

THE HUMANE SOCIETY OF THE UNITED STATES - DR. MICHAEL GREGER ON PANDEMIC PREVENTION - INFECTIOUS DISEASES, AIDS, INFLUENZA, CORONAVIRUS

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